Certificated Mine Inspectors and Mine Bosses.

BY ANDREW ROY.

Two years ago the General Assembly of Ohio enacted a law or rather amended an existing law making provision for the establishment of a Short Mining Course in the Engineering Department of State University. The school for practical miners thus created was an experiment, the first of its kind ever made in this country, and the operation and results of this new departure were looked upon with a great deal of interest by the friends of industrial education. The experiment has proved an eminently successful one, few classes in the University having brighter or more persevering students than those of the Short Mining Course. All the good results contemplated by the friends of this measure will not have been accomplished however until provision is further made by law for Certificated Mine Inspectors and Mining Bosses. This can be done by adding a new Section to the Mining Laws of the State, requiring all applicants for the position of Chief and District Inspectors of Mines and all desiring situations as Mine Bosses to appear before a Board of Examiners appointed for the purpose, pass a satisfactory examination and receive a certificate of competency in order to make them eligible for the positions named above.

The matter of having Certificated Mine Inspectors and Mining Bosses is not a new question and therefore is not an experiment. On the contrary, several of the coal mining States have long made provision for Certificated Mine Inspectors, and one State—Pennsylvania—the greatest of all the coal mining states has for a number of years required all her Mine Bosses to hold certificates of competency. So satisfactory has this system

worked that no one of those interested ever thinks of a return to the political spoils system of appointing Mine Inspectors or the old system of employing Mine Bosses.

Nor is this a new question in Ohio. The first Mining bill introduced in the General Assembly in 1871 by Senator Daugherty contained provisions for the rigid and thorough examinations of applicants for Mine Inspectors with reference to their qualifications, honesty and general good character. During the session of 1882, the question of Certificated Mine Inspectors was again revived by Mr. Love, of Columbiana, himself a practical miner. Mr. Love's bill not only made provision for the examination of applicants for Inspectors of Mines, but for Mining Bosses as well. Bosses of two years experience however being exempted from the provisions of the bill.

In all the continental states of Europe such laws have been in force from the earliest days of mining enterprise and since the passage of the Mines Regulation Act of 1872, all Superintendents and Mine Bosses in the British Collieries are required to undergo examination and receive certificates of competency previous to assuming charge. Such legislation has diminished the cost of mining, saved material from wanton destruction and increased the health and safety of miners.

The wonder is, that Ohio, foremost of all the coal-mining States, with her mining laws and her mining schools, should have so long neglected this important part of mining legislation.

The miners' organizations of the country which have always taken a commendable interest in the proceedings of the Ohio Institute of Mining Engineers, and which in several of their conventions in this State have publicly thanked this Institute for the good work it has done in their behalf, passed a series of resolutions at their National Convention held in Columbus in January last, commending the Short Mining Course in the State University, and pledging themselves on their return to their respective States to use their influence not only to have mining schools after the Columbus model, but to insist on such amendments to the mining laws in all the mining States as would require all applicants for Mine Inspectors and all desiring positions as Mining Bosses to hold certificates from competent boards to entitle them to hold such situations.

Mr. E. B. Willard, of Hanging Rock, then read a very interesting paper on the Manufacture of Pig Iron at Hanging Rock, Ohio.

Mr. President and Gentlemen of the Ohio Institute of Mining Engineers:

The fact that I have been detailed to present a paper on the manufacture of Pig-iron at Hanging Rock, is the only apology I have to offer for this paper.

Strictly speaking, the manufacture of pig-iron at Hanging Rock began on the 16th of March, 1886, when Hamilton Furnace, a coke furnace belonging to Means, Kyle & Co., was put into blast. Previous to that time, for about 60 years, pig-iron had been sold as "Hanging Rock" Iron, but none had been produced at Hanging Rock.

The first furnaces in what is now known as the Hanging Rock Iron Region were on the Kentucky side of the Ohio river, one on Little Sandy river, called Pactolus, one nearly opposite Union Landing on the Ohio river and still another near the mouth of Tiger creek. This latter furnace procured a part of its supply of ore from the Block Veins in Scioto Co., Ohio, near where Franklin Furnace was afterward located.

The first furnace on the Ohio side of the river was Union, built and put in blast in 1826. This furnace was lighted for the first time by Thomas W. Means, who died at Ashland, Ky., June 8th, 1890, owning, at the time of his death, a controlling interest in the lands that constituted the Union furnace tract. The original book, opened at Union, is still in existence. And, as showing the difference between the former times and the present, the first entry on this book reads "Sundries Dr. to Supplies." Then five different men are charged with whisky and one with meal, and "Supplies" has credit.

The second furnace was Pine Grove, put in blast in 1827 and has made more or less iron every year since, and promises to continue for some years to come. The third furnace was Franklin, in Green Township, Scioto Co. Union and Pine Grove procured their supplies of ore from what is known as the Limestone vein. Franklin procured its supply from the Block vein. Other furnaces were built on the ore belt, which extends in a northeasterly direction from the Ohio river, its western limit being at Franklin furnace, its eastern at Monitor furnace, now Petersburgh. At one time there were in Ohio and Kentucky over sixty furnaces, all charcoal, in the Hanging Rock region. The earlier furnaces on the Ohio side, depended on the Ohio river as a means of transportation to market, and made Hanging Rock the landing from which they shipped their product. Hence the name Hanging Rock iron region. These furnaces procured their entire supply of ore by stripping or benching, which consisted in simply following the out-cropping of the ore around the hillsides and removing the ore that lay

above drainage. Little or no mining was done until after the war. In fact, for use at the charcoal furnaces, but little ore has been mined. There were two reasons for this, one that the best and purest ores lay near the surface, the other was that stripping or benching was the cheaper method of getting the ore. No skilled labor was required. The ore diggers, as they were called, were paid by the ton, the ore being weighed at the furnace. Every man worked where and when he pleased, and was held responsible for the quality of the ore he sent in. If he happened to go down on a spot of ore that was not considered satisfactory by the man who weighed the ore, it was rejected without hesitation, and the digger got nothing for his labor. This method of procedure tended to make the diggers watchful and cautious about sending poor or injurious ore, and the places where the ore was not good, soon became well known. In early days no analyses were taken or thought of. The only test of ore known was by the eye, and trial in the furnace. The only deleterious substance ever heard of was sulphur. The only reason for condemning an ore was the presence of sulphur.

Little or no scientific knowledge or practice was thought of in connection with the management of a furnace. If a furnace did not work satisfactorily, the common remedy was to blow out and put in a new hearth. Dampness about the base of the stack was considered fatal to good working of a furnace. Yet they made good iron, because they had the best of fuel, good charcoal, and pure ores, and the Hanging Rock charcoal irons were better irons for a wider range of uses than perhaps any other irons in the country. They were shipped as far east as Buffalo and west as St. Louis. The early furnaces of this region all had a corps of moulders and made stoves and hollow ware very largely. This doubtless is the reason why the cast-house was always called the pot-house.

I give an average sample of these surface ores as used by the early furnaces:

	Limestone Ore.	*Block Ore.*
Metallic Iron, . .	62.26 per cent.	50.34 per cent.
Sulphur, . . .	.054 per cent.	Trace per cent.
Phosphorus, . .	.434 per cent.	.559 per cent.
Silica, ...	7.113 per cent.	22.62 per cent.

These analyses apply to the crop ores, which have been weathered and leached by exposure until a very large proportion of the deleterious substances has been removed.

These ores were originally carbonates, belonging to the coal formations. As the surface ores were dug out and the

veins were followed into the hill under heavy cover, the proportions of carbonic acid and sulphur, remaining in the ores, increased and the ores became leaner and more impure. Hence as the surface ores become exhausted, the Hanging Rock irons deteriorated in quality, lost prestige, and became more and more expensive to make, and only a few furnaces, which had large tracts of surface ores, were able to maintain the quality of their iron and continue its manufacture.

Since the manufacture of coke iron was begun some twenty years since a much greater consumption of ore has taken place, and it has been necessary to drift or mine ore quite extensively. These mining operations have been carried on most extensively along the line of the Iron R. R. in Lawrence Co. and the ores were used mostly at Ironton. While these ores make good iron they are rather lean on account of the difficulty of freeing them from the slates and clays, in which they are bedded. On account of the leanness of the ores, and the high cost of coke, the furnaces have been unable to meet competition from the South, during the past few years, since prices have been so low.

The Long Wall system of mining was tried quite extensively by the Etna Iron Works Co., and found not applicable to the character of the strata. The system now in use is the Pillar and Stall, same as in mining coal, but rooms are seldom driven more than forty yards, because it is much more difficult to ventilate an ore mine than a coal mine.

There does not seem to be much prospect of increase in the manufacture of iron in the Hanging Rock region, because the quality and quantity of the native ore accessible is not such as to justify it. Lake and other ores cannot, so far as now known, be brought into this region at prices that will induce the building of more furnaces.

The completion of the Norfolk & Western and C. C. C. R. Rs., which seems to be probable within the next three years, promises to insure a supply of good coke at lower prices than heretofore, but still not at prices as low as Connellsville coke at Pittsburgh.

I would conclude therefore that by the more liberal use of Lake ores the furnaces of the Hanging Rock region, will be able to continue in business and to retain a place for the Hanging Rock iron in the markets of the country.

DISCUSSION: President Howells asked why he thought an ore mine was harder to ventilate than a coal mine? to which Mr. Willard replied that it was owing to the want of height of the vein and that for some reason air would not circulate

through stratas of slate as well as through coal. Mr. D. J. Harry differed from Mr. Willard and argued that the ore mines were the easiest of the two as they were much cooler and that as a rule the ore mines were the best ventilated. Mr. T. F. Smith defended Mr. Willard's position and said that where the ore was thinner than the coal there would be increased friction which would require increased power to the increased resistance. That if the area was the same there would be no difference. Mr. Morris thought that the area being the same there would be no difference. T. L. Watkins argued that under similar conditions and equal area the ore mine would be the easiest as the refuse of the mine would fill all the space and force the air to the faces. W. B. Rennie said that he was surprised to hear the opinions of these gentlemen as it required more powder to mine ore than it did coal, therefore, it would require more air to remove the smoke. Mr. Harry moved a vote of thanks be tendered Mr. Willard for his very able and instructive paper, which was carried.

Mr. T. L. Watkins then read a paper on the Coals of Vinton Co:

Mr. President and Gentlemen of the Ohio Institute of Mining Engineers:

This is my first attempt to write an article to be read in public. I therefore ask you to bear with me while I try to say a few words on the coals of Vinton County. I will commence by saying that there are eight seams of coal to be found in the county, to my knowledge. The first of these is No. 2, or the Wellston coal, which is now worked at Elko, at a depth of one hundred and forty feet from the surface, and, while the coal is thin, falling below three feet in thickness, it is of excellent quality, and I think that there may be found some valuable basins within the extensive territory in which they are due in the county. The next in order is the Lower Mercer or No. 3. This coal makes a better showing in Vinton, than any other county in the State, Holmes excepted (according to the Geological Survey, vol. 5). It exceeds three feet at various points in the county. The Zaleski Company have thoroughly proved it and know that it has a thickness of four feet on their lands. So it is not volume, neither is it quality that is lacking; the trouble comes from its numerous slate partings, which makes it too expensive to prepare for market with so much competition as there is in the coal trade at present. But the time un-

doubtedly will come when it will be extensively worked. The next is No. 3 "A." This coal has a thickness exceeding three feet, also, and some of its benches are of good quality, in fact, the whole seam is fair, but like the preceding one, it has its thin slate partings and they are hard to separate. No. 3 "B" falls a little below three feet where I have seen it and is in two benches; there is a good quality of cannel coal in it, about six inches thick. It is not worked in the county to my knowledge except in a small way for home use. The next is No. 4. This coal, I understand, is not mined for the market in the State except in Vinton and Stark counties. This seam, I consider, is the most valuable deposit in the county; it has a thicknes at, and around Zaleski, of from four to five feet; and on the Zaleski Company's estate, is of superior quality. As a steam coal it is unsurpassed and for domestic purposes I think there is no better mined.

Several parties of Zaleski have tried the Wellston coal, but after a fair trial, prefer the No. 4. It is firm and compact and mines larger, and will bear handling better than any other coal in Southern Ohio. There is a large area of this coal and is practically intact; it is now shipped for market by the Zaleski Company all along the line of the B. & O. South-Western, its branches and connecting lines also. And it gives general satisfaction both as a steam and domestic fuel.

The next coal is No. 5, or the Lower Kittanning. This seam is everywhere present in the Vinton field. Where its horizon is found it generally falls below three feet but I have seen it three feet and four inches thick; it is of fair quality. We also have No. 6, ranging from three to four and a half feet in thickness and while it is not as thick as the Hocking Valley coal, it is of exceeding good quality, and the same characteristics of this seam are true of it in Vinton as well as other parts of the State, its steadiness and persistency which makes it a safe basis for large mining enterprise. The Zaleski Company have been mining this coal for the past thirty years, and still have a large area left. No. 7, or the upper Freeport coal, is to be found in Vinton County, near the tops of the hills. It is from three to three and a half feet thick. There is no place where it is worked, to my knowledge. I have not seen it, and write this from information received from other parties, but it has a well marked horizon in many places.

The coal supply of Vinton is obtained from Nos. 3, 4, and 6. This, gentlemen, is all I have to say on the coals of Vinton County. To do it justice, would be to write a treatise on geology, which I am not able to do.

THOS. L. WATKINS.

Mr. Harry objected to that portion of Mr. Watkins' paper where he claimed that the No. 4 vein where mined in Vinton Co. was the best coal in Southern Ohio and said that the Jackson Hill and Wellston coals were the best in the Southern portion of the State. To which Mr. Watkins replied that if it was not the best in Southern Ohio it had been proven by actual test that a ton of No. 4 Vinton Co. coal had drawn a railroad train nine miles further than a ton of Wellston coal.

A vote of thanks was tendered Mr. Watkins for his excellent paper.

Mr. R. M. Haseltine next read a paper on the advancement of electricity in the mines of Ohio during 1889.